Natural Resource Inventories:

Forest Blocks, Wildlife Corridors, Natural Communities, and Rare Species!

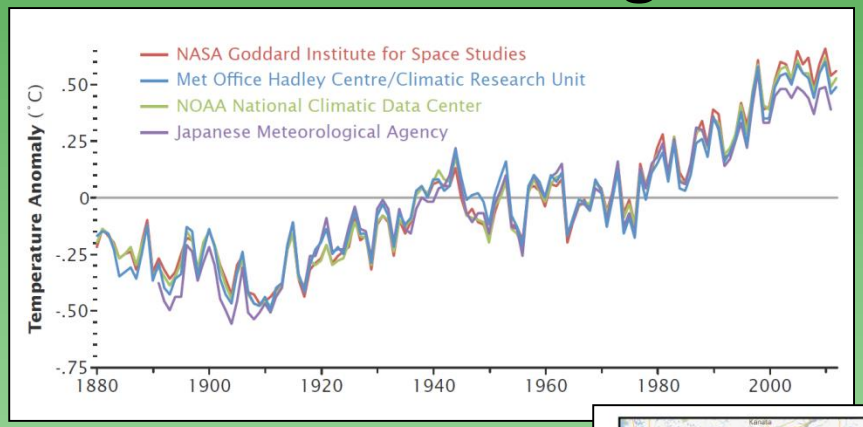
Everett Marshall and Eric Sorenson
Natural Heritage Inventory
Fish and Wildlife Department
Vermont Agency of Natural Resources

Outline

- Background on threats and conservation of biological diversity
- Vermont Conservation Design as a guide
- Purposes and benefits of a town-wide inventory
- What natural resource features are commonly included in a detailed town inventory?
- Practical considerations in conducting a town inventory
- What data are available and how to get it?
- How to use forest block, connectivity, natural community, and rare species data at the town level?
- Questions and Discussion

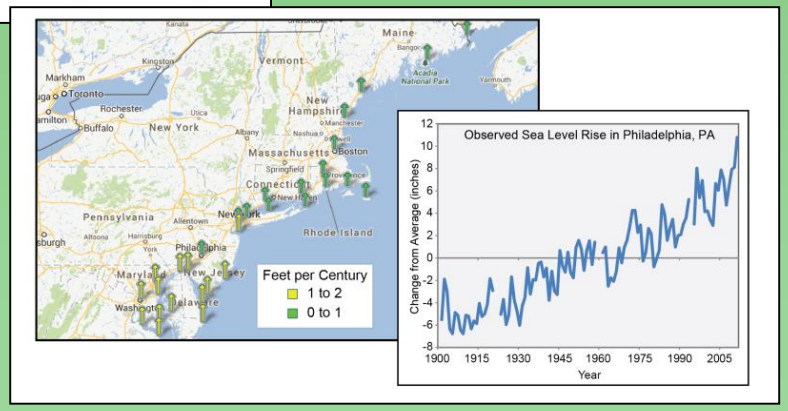
Primary Threats to Biological Diversity

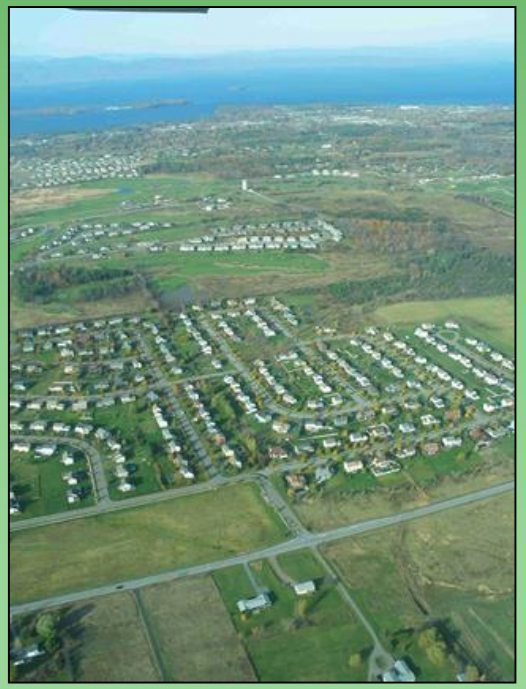
- Population growth
- Habitat loss
- Habitat fragmentation
- Non-native, invasive species
- Climate change – direct and compounding effects



NASA

Climate Change Impacts in the US, 2014





Terminology

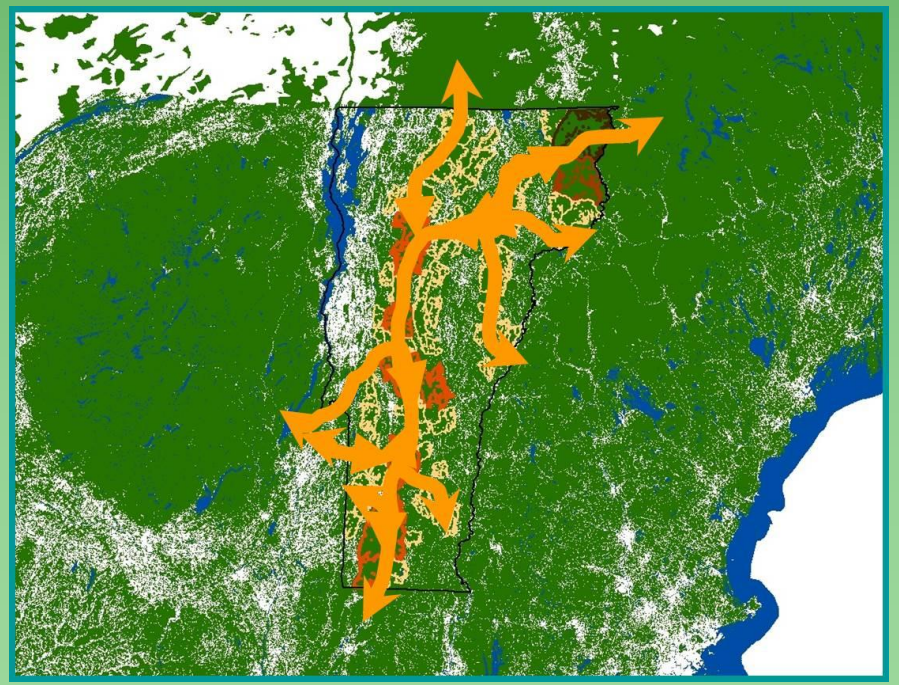
<u>Habitat Fragmentation</u>: ***dividing land with naturally occurring vegetation and ecological processes into smaller and smaller areas as a result of roads, land clearing, and development.***

Terminology

<u>Landscape Connectivity</u>: ***the degree to which blocks of suitable habitat are connected to each other, allowing movement of species and functioning of ecological processes.***

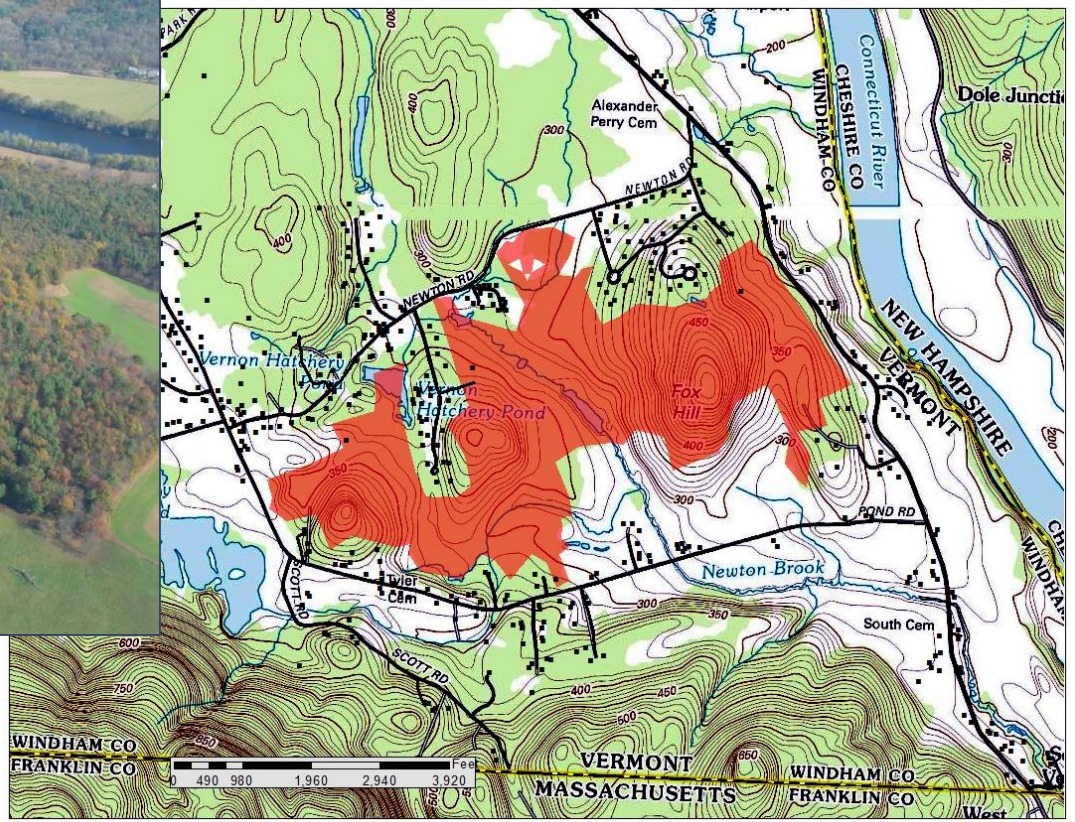
Local Connectivity

Regional Connectivity



Terminology

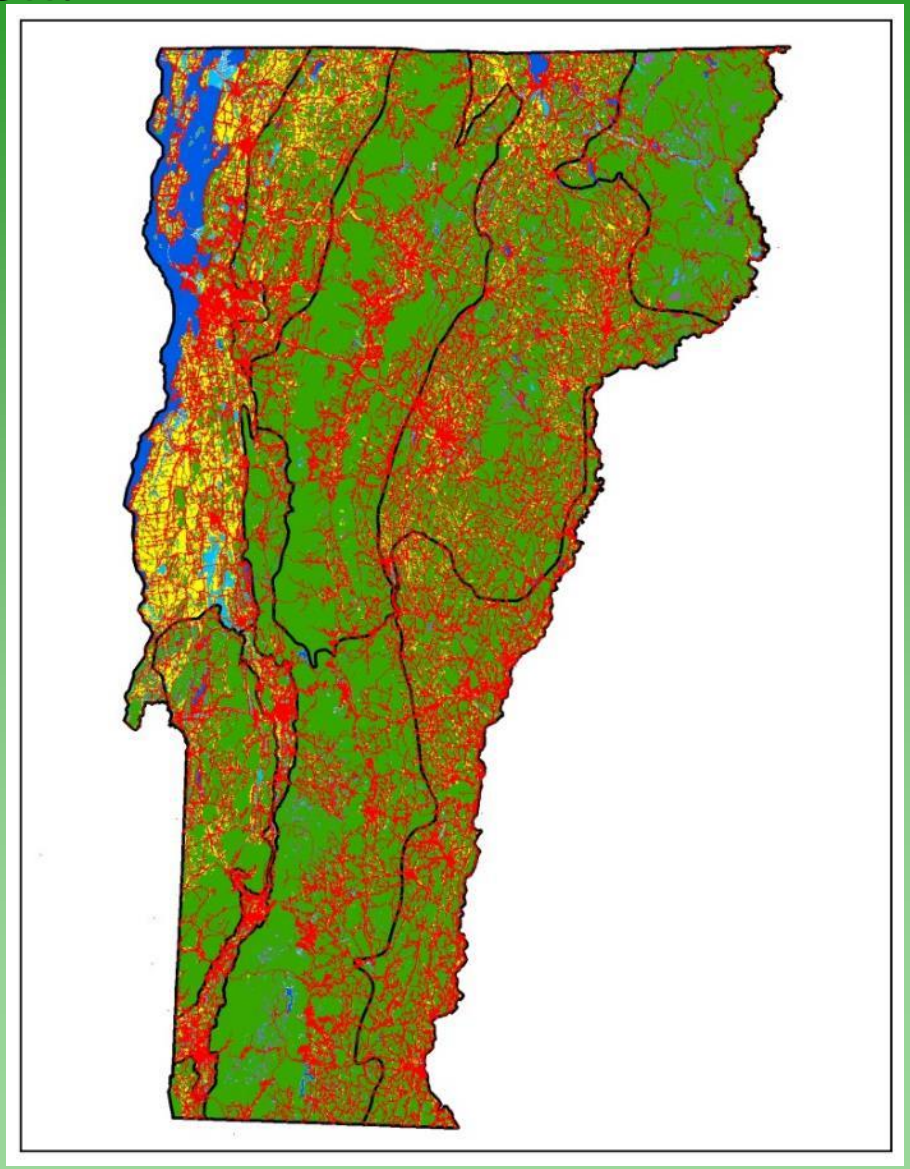
<u>Forest Blocks</u>: ***areas of contiguous forest and other natural habitats (wetlands, ponds, cliffs,…) that are unfragmented by roads, development, or agriculture.***



Much of Vermont is dominated by natural systems and we have a lot of opportunity to conserve biodiversity and facilitate climate change adaptation.

- 78 percent forested
- abundant lakes and wetlands
- limy bedrock
- diverse topography
- low human population
- cultural interest in wildlife and rural character

- But, also a lot of roads and development

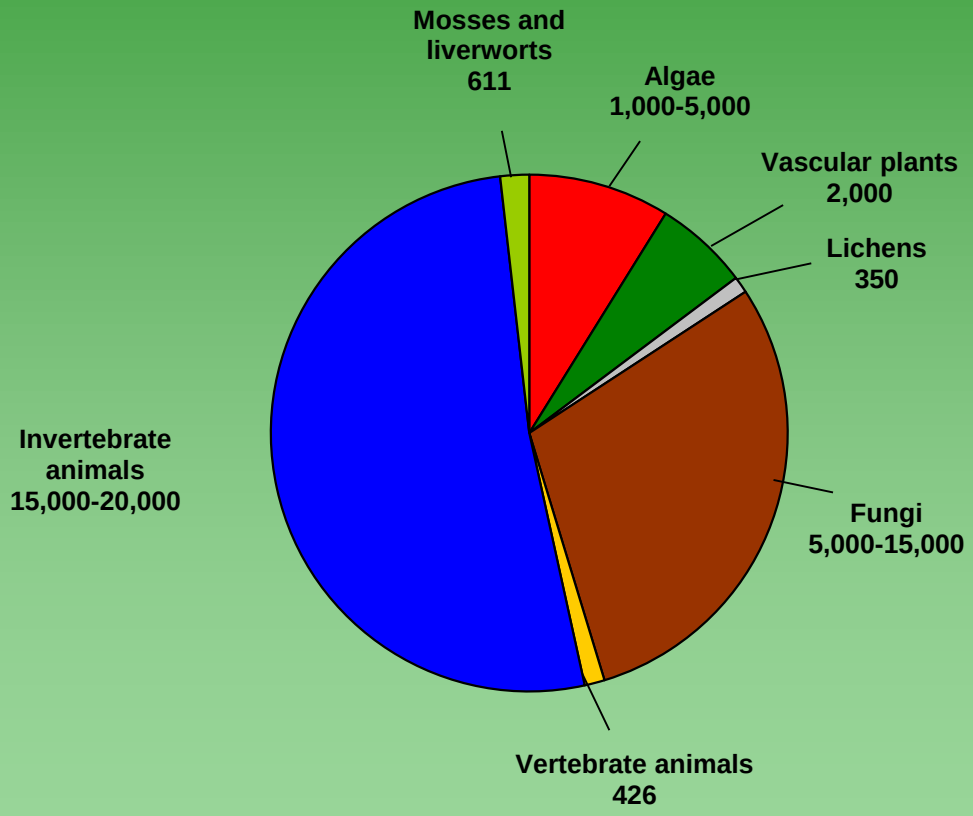


Fragmentation

- Residential development is occurring at low densities in rural areas
- Not in compact existing centers or planned growth centers
- 4 out of 381 subdivisions trigger Act 250

Given a broad goal of conserving biological diversity in Vermont...

And, an estimated 24,000 to 43,500 species in Vermont!

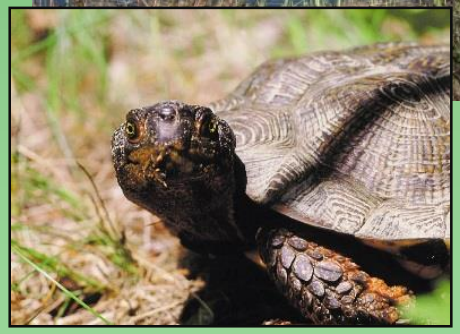


How do we protect them all?

Elfin Skimmer

Coarse filter/fine filter approach to conservation

If examples of all coarse-filter elements are conserved at the scale at which they naturally occur, most of the species they contain – trees, mammals, birds, insects – will also be conserved. Some species will always need special attention.



Conservation Design at Three Scales

Landscapes

Champlain Valley

Interior Forest Blocks
Connectivity Blocks
Surface Waters and Riparian Areas
Riparian Areas for Connectivity
Physical Landscape Diversity Blocks
and Wildlife Road Crossings

Natural Communities

Dry Oak-Hickory-Hophornbeam Forest

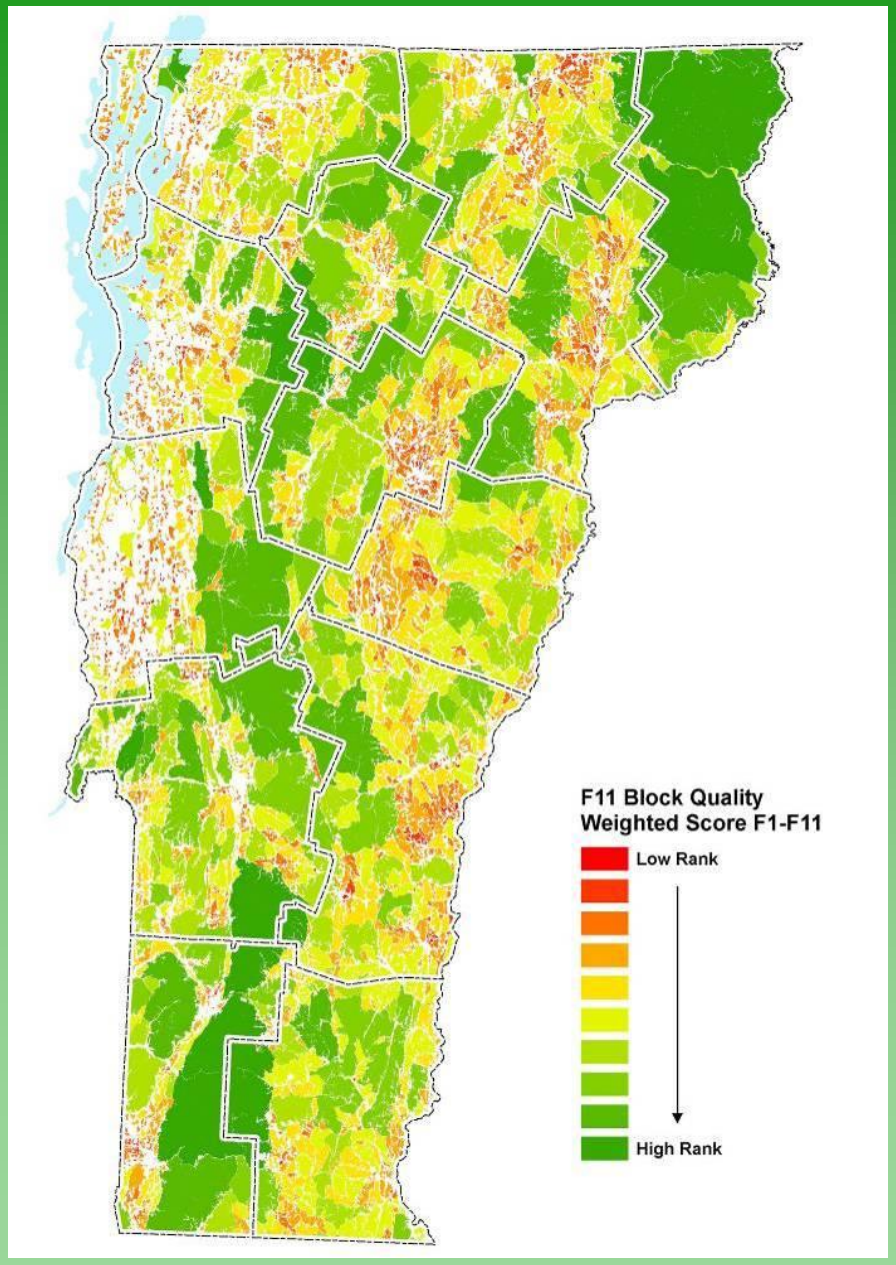
Upland and Wetland
Aquatic
Vernal Pools
Old Forest
Young Forest
Grasslands

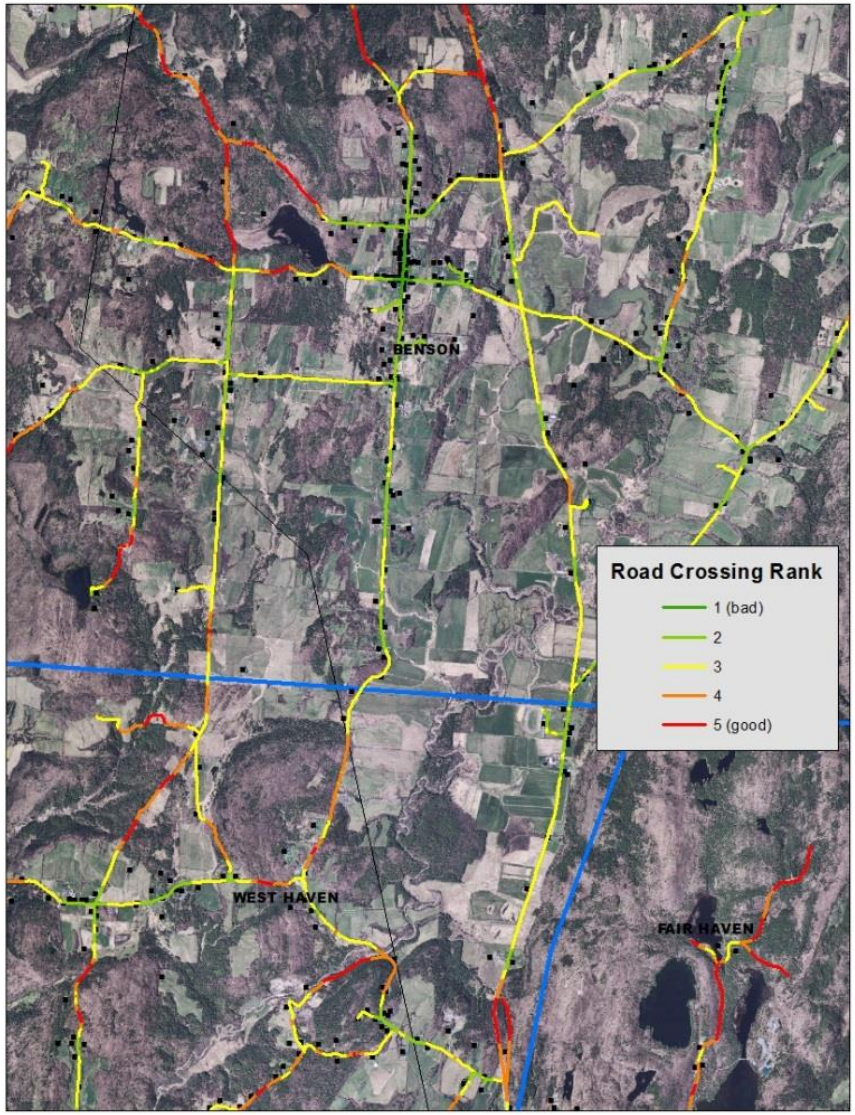
Species

Southern Twayblade (*Listera australis)*

Rare Species
Spp of Greatest Cons. Need
Pollinators…

Forest Block project





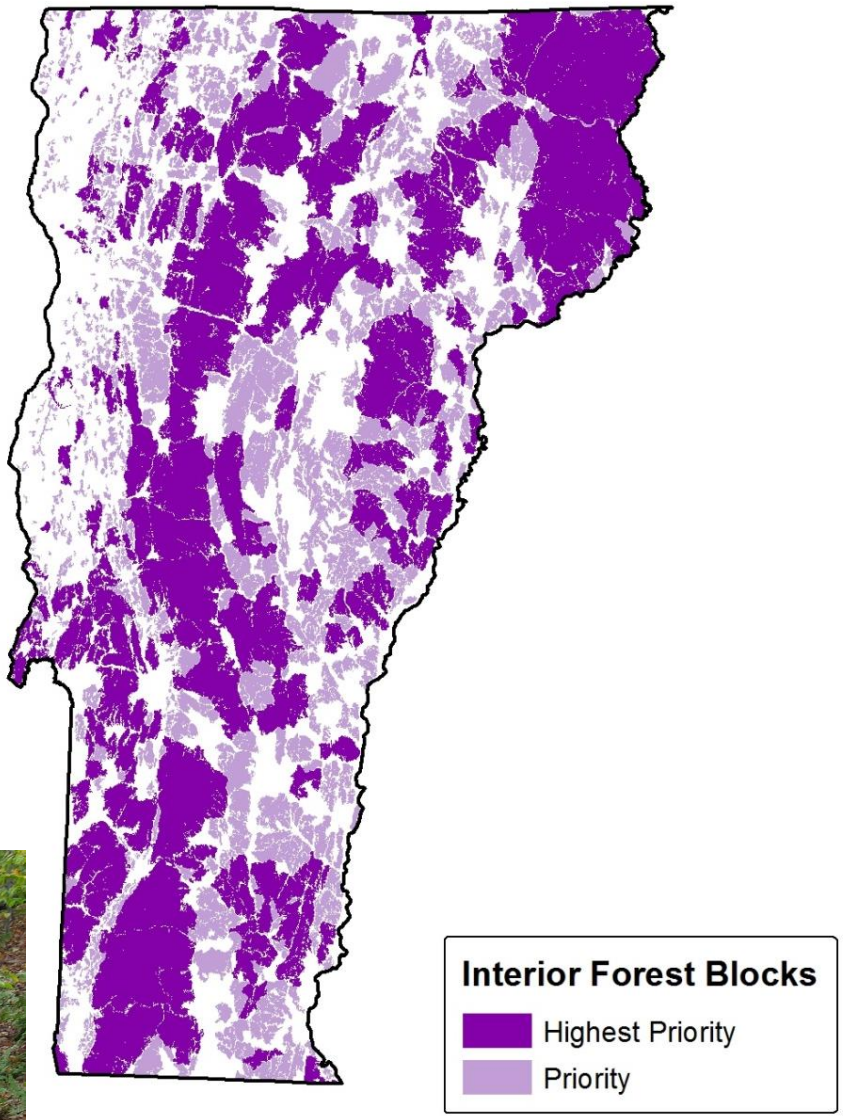
- 4,055 forest blocks identified
- Each block ranked for 11 biological and physical factors and total weighted score

Interior Forest Blocks

Definition: Areas of contiguous forest and other natural communities and habitats that are unfragmented by roads, development, or agriculture.

Ecological Function:

- Ecological processes
- Air and water quality
- Flood resilience;
- Interior forest species
- Wide-ranging mammals
- Source populations
- Large, topographically diverse forest blocks allow species to shift in response to climate change.

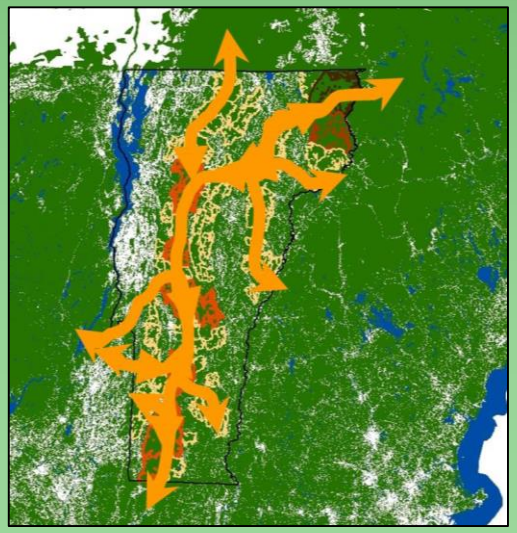


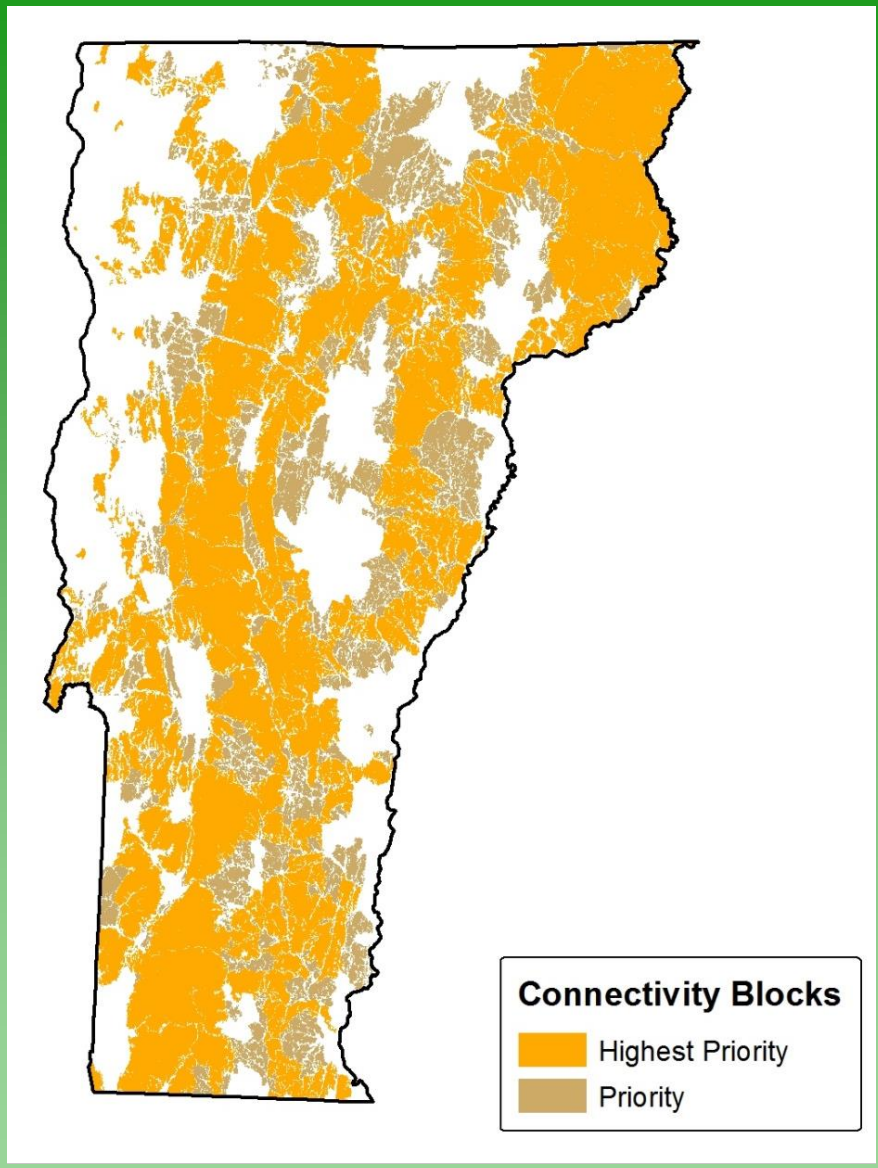
Connectivity Blocks

Definition: The network of forest blocks that together provide terrestrial connectivity at the regional scale (across Vermont and to adjacent states and Québec) and connectivity between all Vermont biophysical regions.

Ecological Function:

- Wide-ranging animal ranges
- Daily and annual habitat needs
- Young animal dispersal
- Plant and animal species range shift with climate and land uses change
- Genetic exchange and other processes



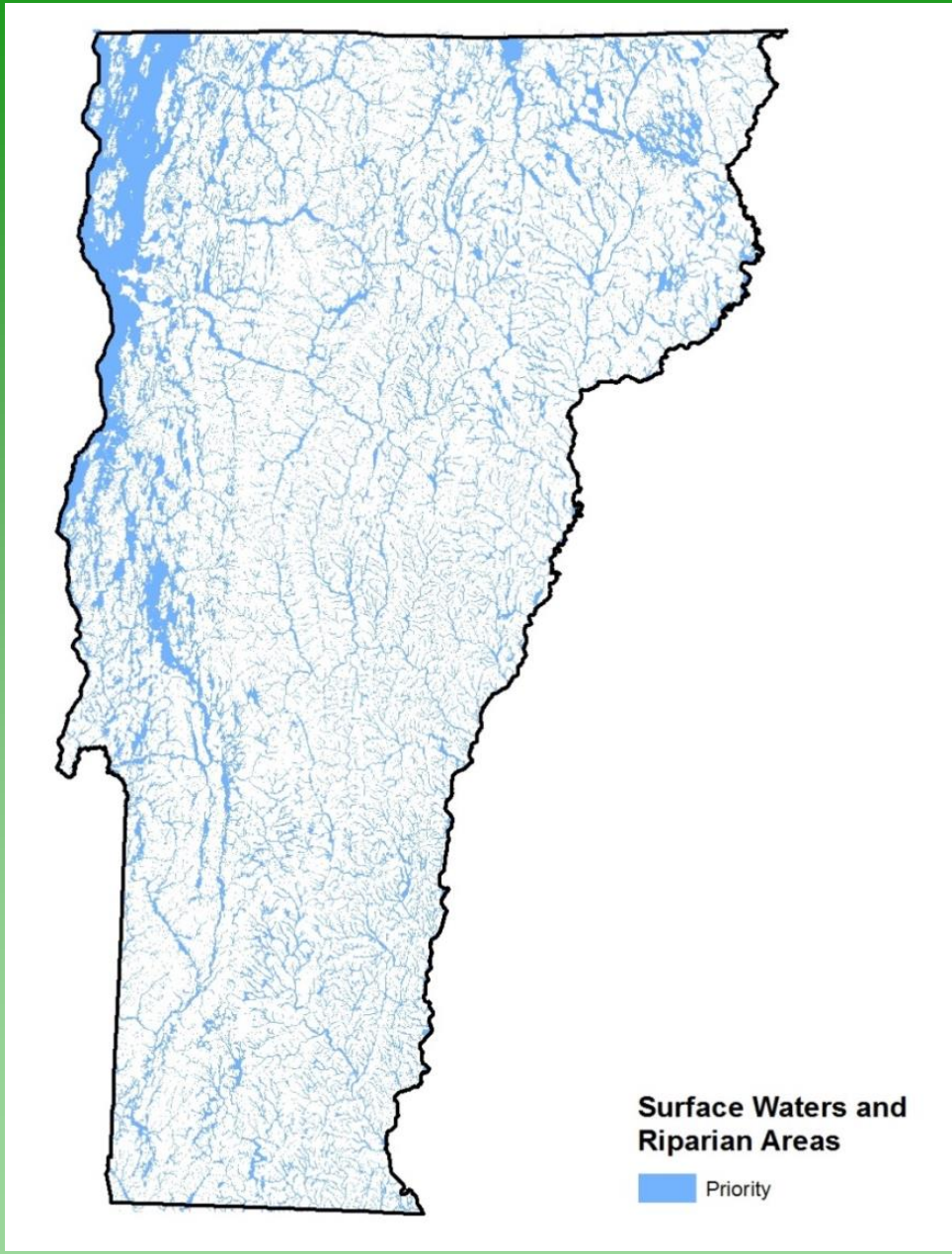


Surface Waters and Riparian Areas

Definition: The network of all lakes, ponds, rivers, and streams, their associated riparian zones and valley bottoms in which geophysical processes occur.

Ecological Function:

- Aquatic species habitat
- River geomorphic stability and floodplain access
- Stabilize shorelines, store flood waters, filter and assimilate sediments and nutrients, shade adjacent surface water, and contribute organic matter
- Biodiversity – species and communities
- Wildlife corridors
- Plant and animal range shifts in response to climate change

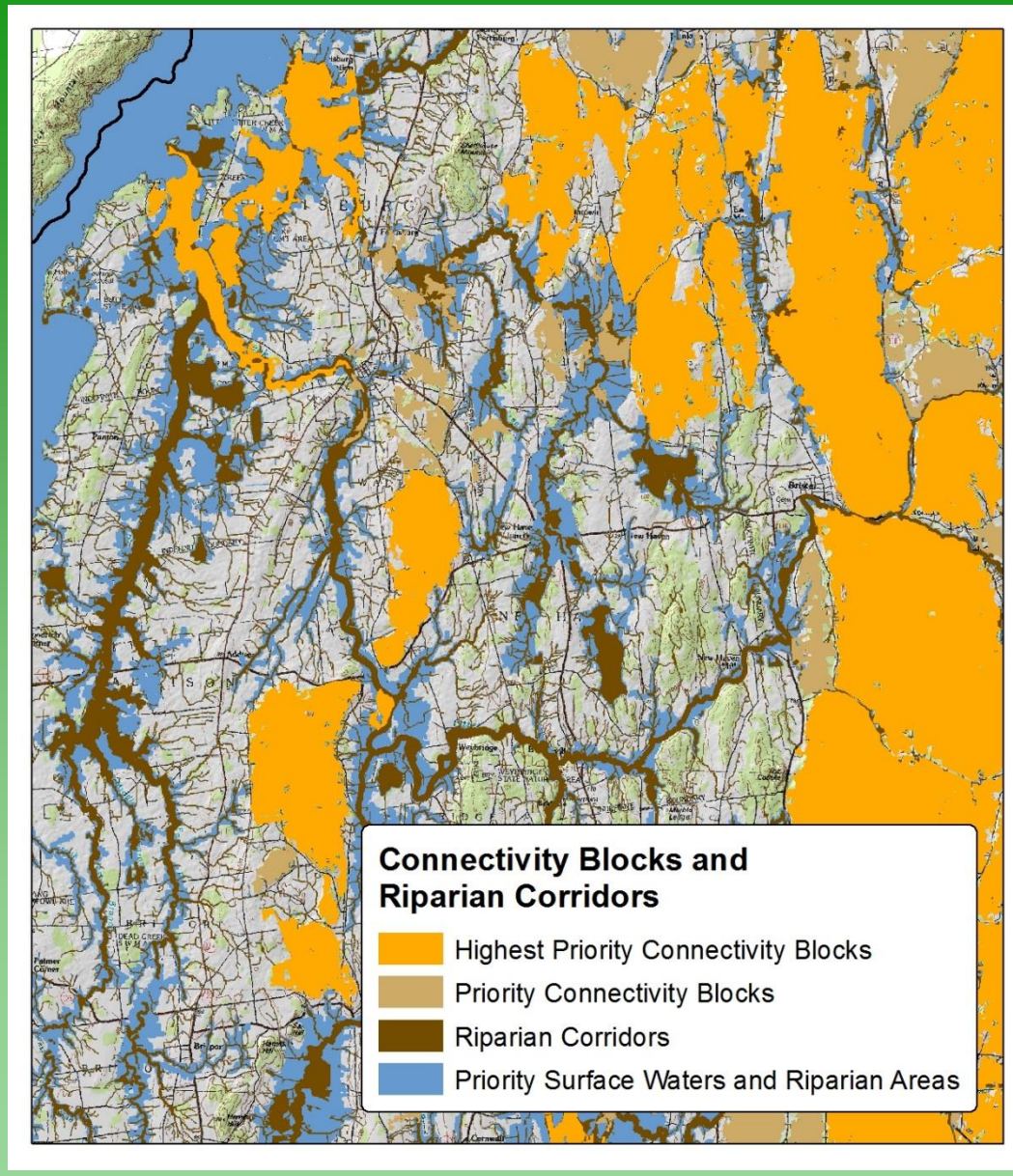


Riparian Areas for Connectivity (Riparian Corridors)

Definition: The connected network of riparian areas in which **natural vegetation occurs**, providing natural cover for wildlife movement and plant migration.

Ecological Function:

- Integrity of the lakes, ponds, rivers, and streams
- Wildlife cover movement
- Obligate habitat for mink, otter, beaver, and wood turtle
- Riparian areas and Connectivity Blocks together form a functional network.



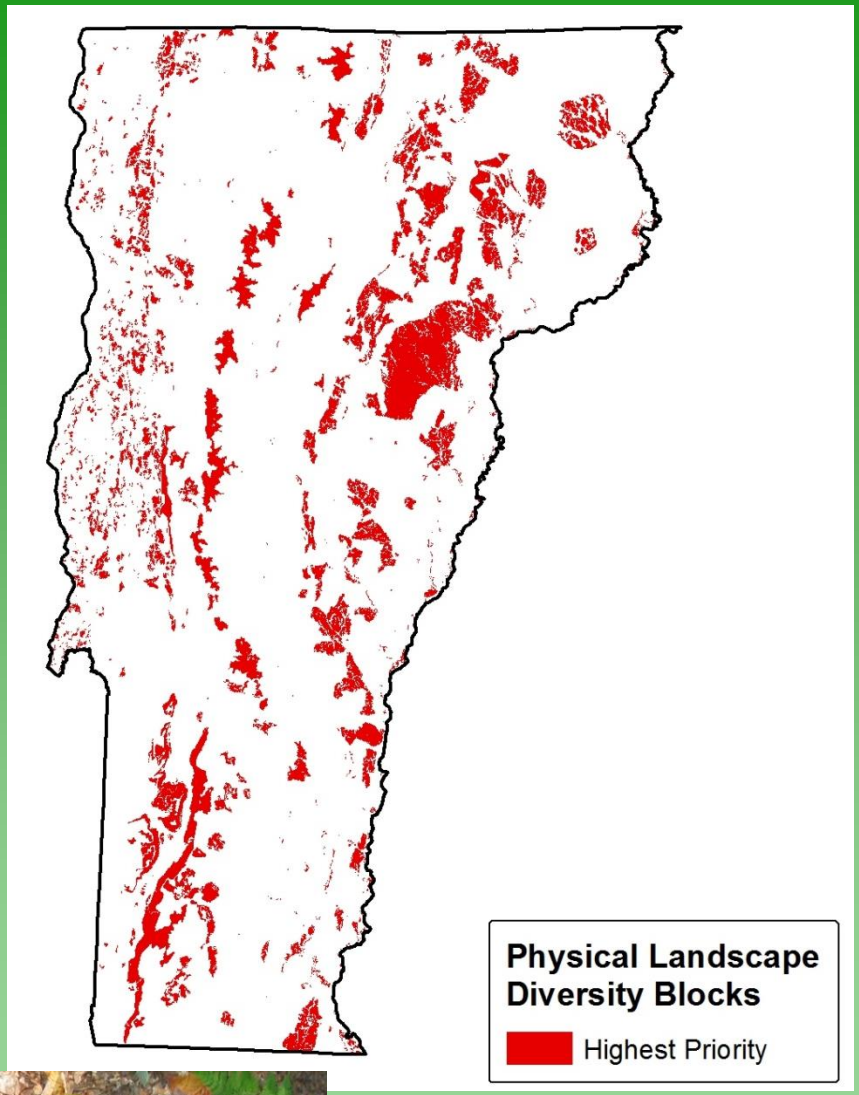
Vicinity of Ferrisburgh, Panton, and Vergennes.

Physical Landscape Diversity

Definition: A set of forest blocks and other areas of natural vegetation that include physical landscape diversity features that are either rare in Vermont or under-represented in the other landscape elements.

Ecological Function:

- Physical landscape diversity (bedrock, soils, elevation, landform,…) represents potential biological diversity.
- "Conserving Nature's Stage"

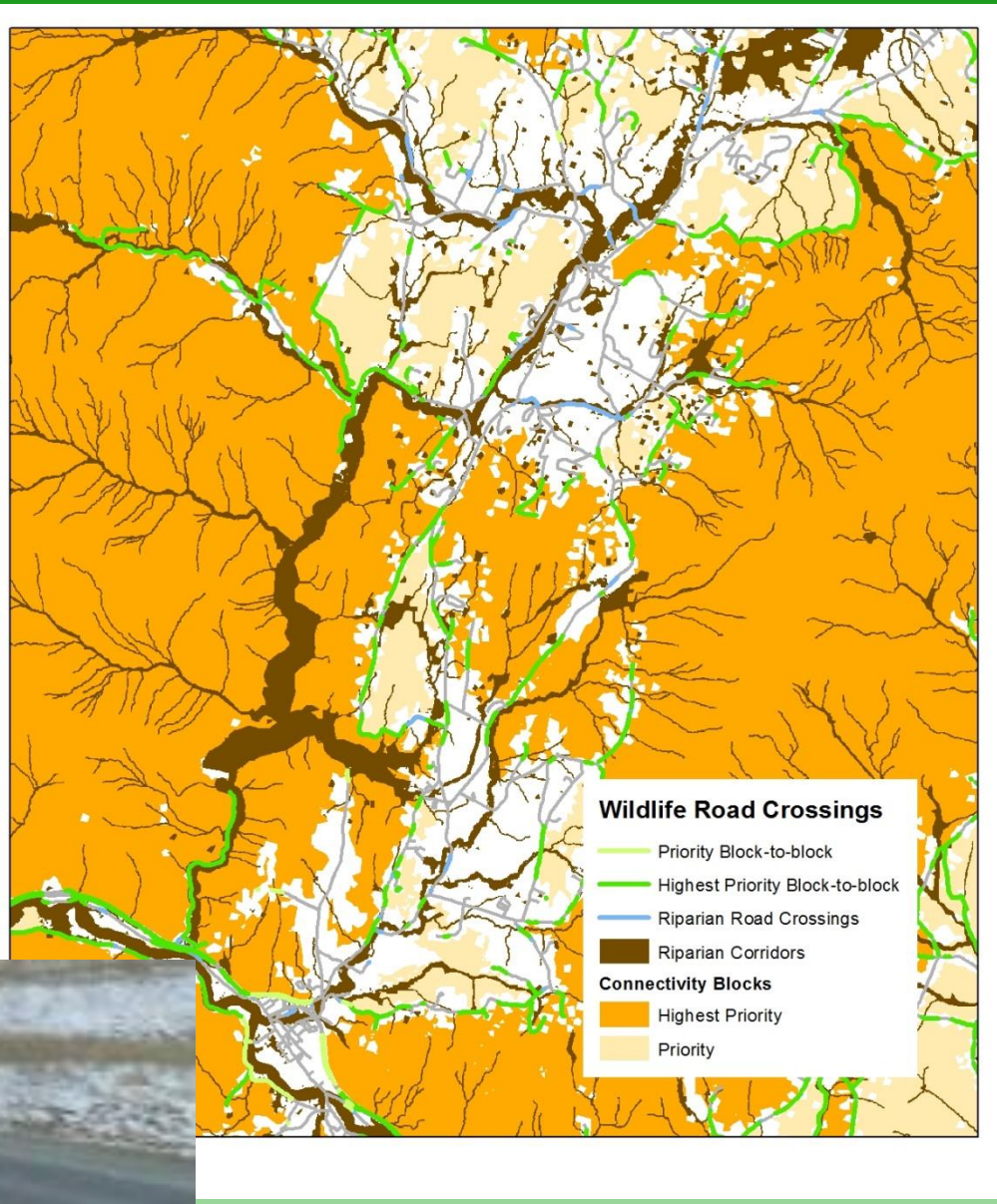


Wildlife Road Crossings

Definition: A section of road with high structural connectivity between two forest blocks or along a riparian corridor.

Ecological Function:

- Provide the best opportunity for wildlife movement and dispersal of other species across roads
- Wildlife road crossings over or under roads are critically important between adjacent forest blocks and along linear riparian area networks.



Waterbury-Stowe area

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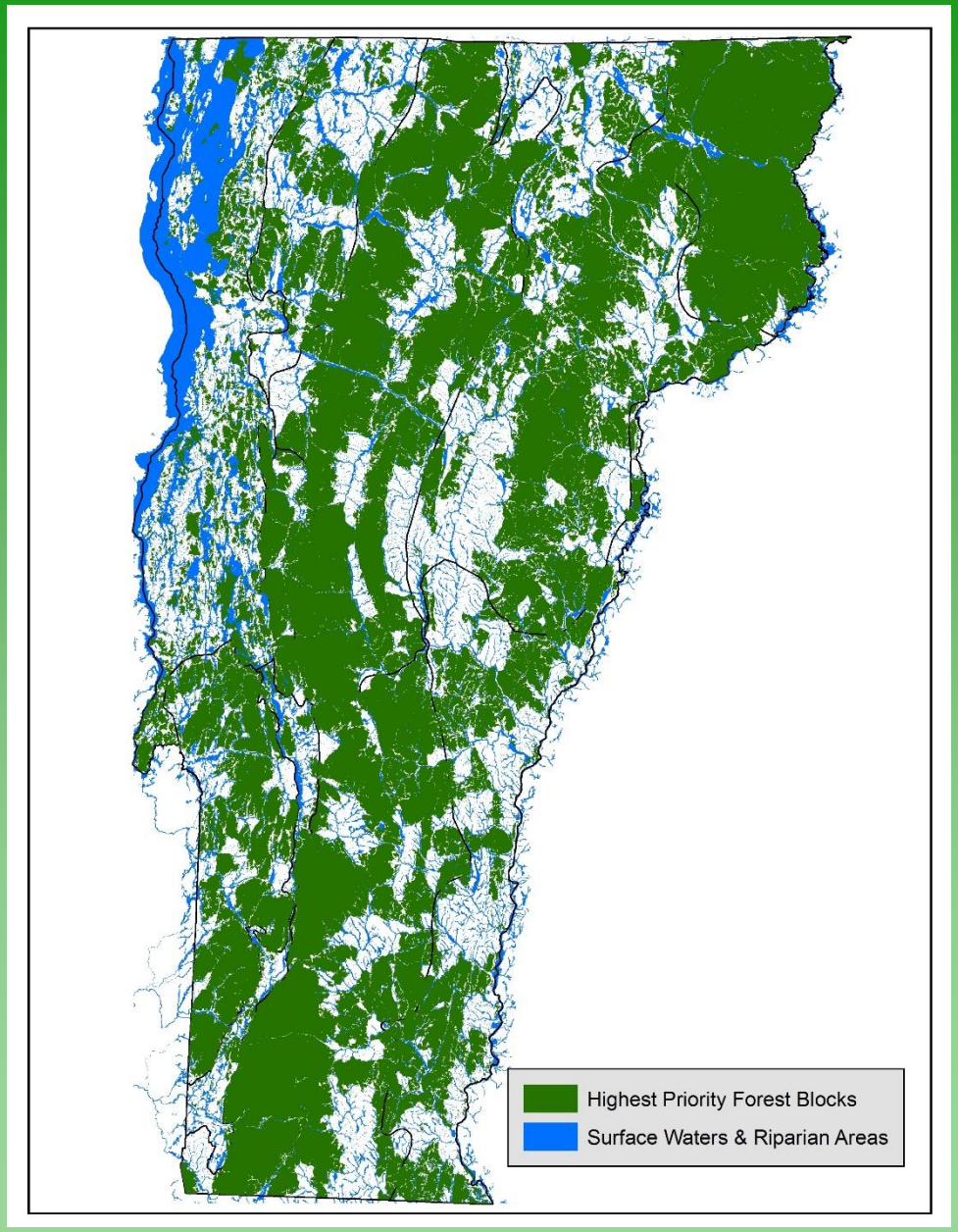
Putting it All Together: The Ecologically Functional Landscape

Large areas of connected forest, aquatic systems and riparian areas, natural communities that allow ecological processes to occur and species to access required habitat and shift across the landscape in response to climate and land-use change

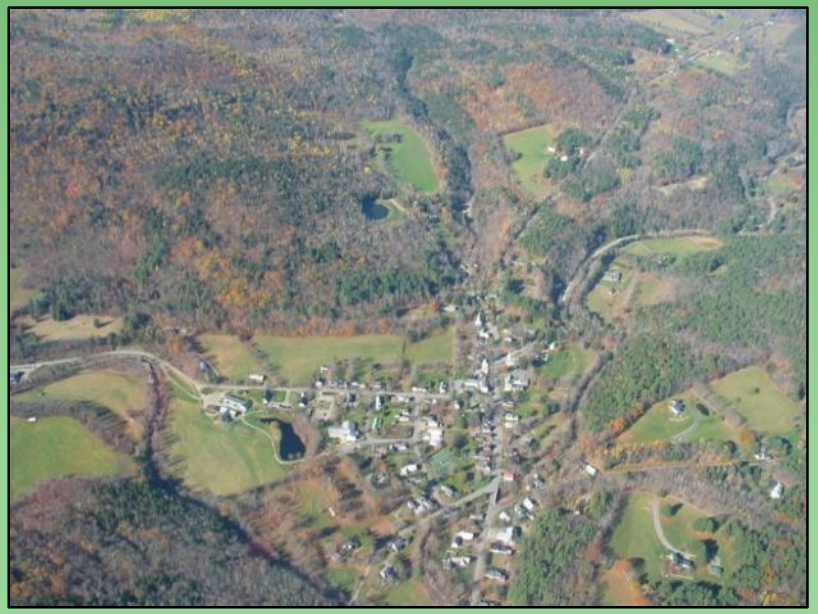
“Conservation” in all its forms.

A vision for the future that relies on Vermonters and landowners interest and commitment.



Purposes and benefits of a town-wide inventory

- Planning!! Vision for the future of the town.
- Incorporate results into the town plan.
- Increasing connection between town residents, landowners, and natural features in town.
- Improving understanding of how town fits into broader conservation picture – state and regional.
- Identify targets for conservation and/or restoration.



Collecting Existing Information for the Town

http://biofinder.vt.gov/

http://anrmaps.vermont.gov/websites/anra5/

- **VT Fish and Wildlife Data**
  - Natural Heritage species and nat. comm.
  - Deer wintering areas
  - Vermont Conservation Design
- **Water Resources and Wetlands**
- **Conserved Lands**
- **Land Use & Land Cover**
- **Prime Agricultural Soils**
- **Aerial Photos**
- **Bedrock Geology and Soils**
- **Tax map overlays**

What natural resource features are commonly included in a detailed town inventory

<u>Landscape scale</u> (large features that function beyond town boundaries)

- **Forest blocks**
- **Habitat connectivity or travel corridors**
- **Riparian area**

Inventories can provide site-specific information to supplement the statewide data that are available.

What natural resource features are commonly included in a detailed town inventory

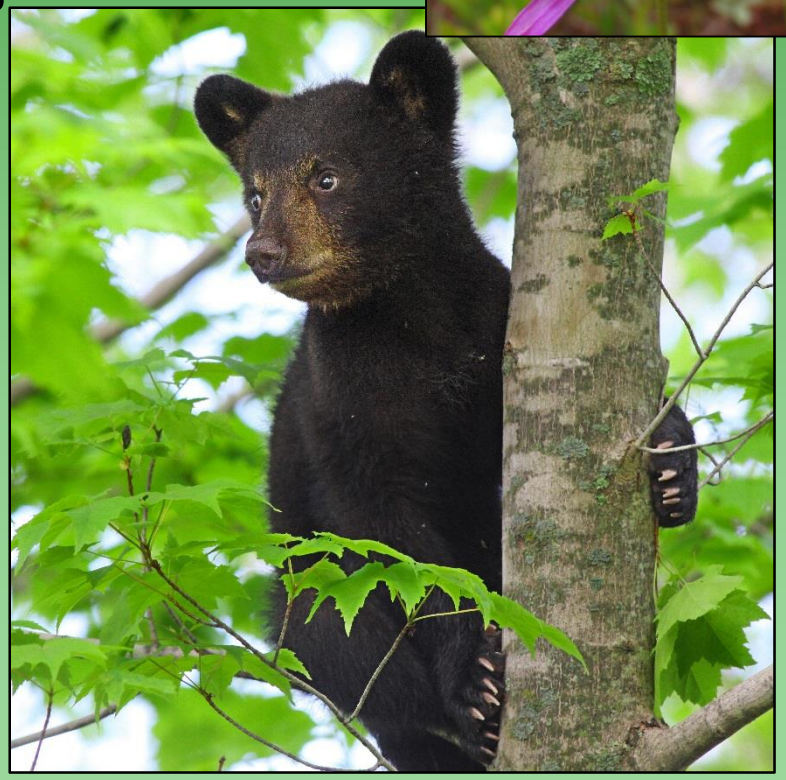
Natural Community scale

- Natural communities
- Wetlands
- Vernal Pools
- Lakes and ponds
- Rivers and streams
- Riparian areas

What natural resource features are commonly included in a detailed town inventory

Species and Habitat scale

- Rare and uncommon species
- Deer winter habitat
- Mast stands
- Early successional habitat
- Old Forest
- Ledge, talus, and cliff
- Grassland birds
- Caves



What are Rare, Threatened & Endangered Species

- **Endangered**: a species in immediate danger of becoming extirpated in the state (state and federal laws) (ex. Indiana Bat and Dwarf Chinquapin Oak)
- **Threatened**: a species with high possibility of becoming endangered in the near future (state and federal laws) (ex. Eastern Ratsnake and Creeping Juniper)
- **Very rare**: (S1) generally fewer than 5 populations statewide
- **Rare**: (S2) generally 20 or fewer populations statewide
- **Uncommon**: (S3) generally fewer than 80 populations

Why is rare species information so important?

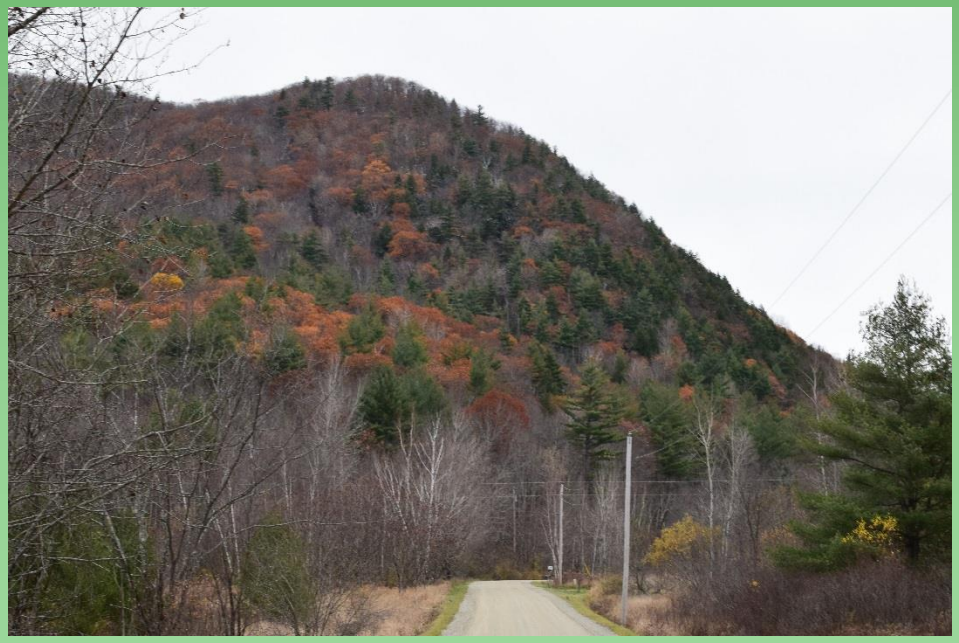
Conserving healthy populations of all native species is the cornerstone of conserving biological diversity.

Erwin Bauer USFWS

What data are available from VFWD/NHI

- **Rare threatened and endangered species**

  - also a new layer called uncommon species
- **Natural communities**
- **Deer winter areas**
- **Bear mast stands and spring feeding areas**
- **Forest blocks, Statewide connectivity and Riparian areas**
- **Road crossing**
- **more…**



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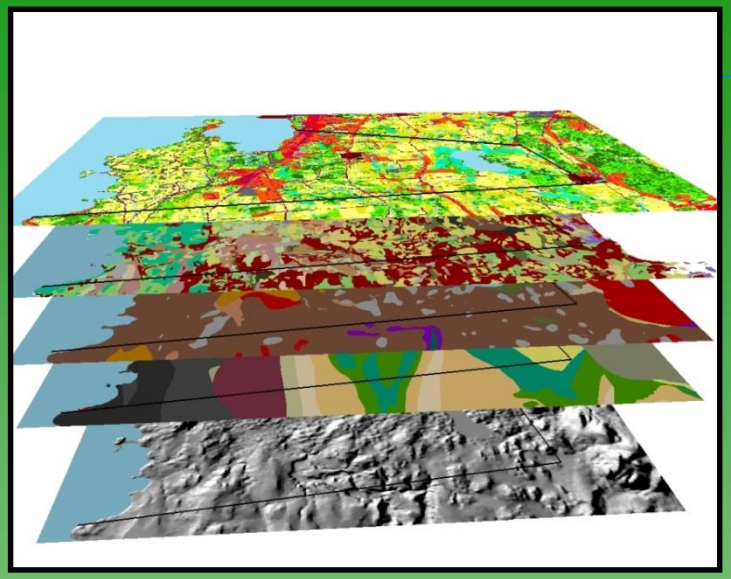

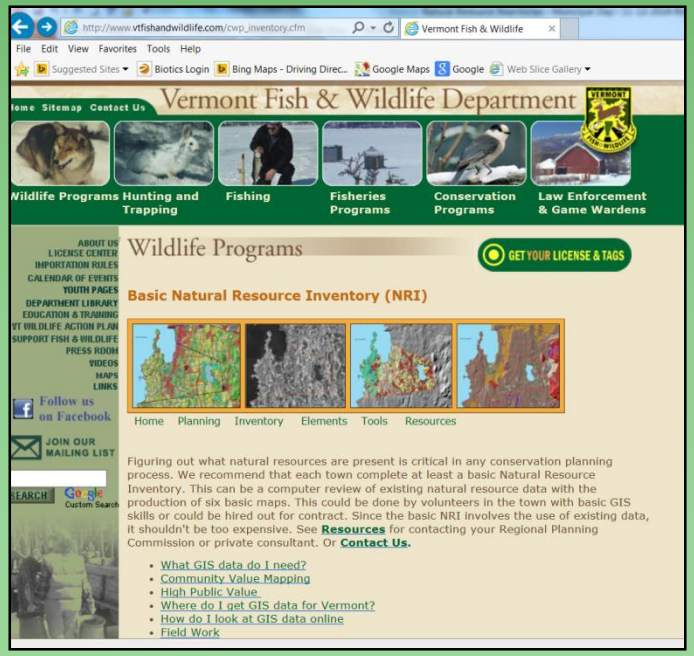

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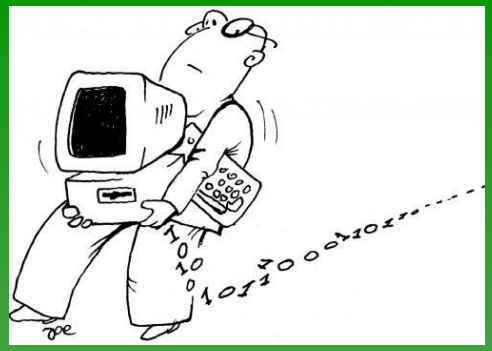
http://www.vtfishandwildlife.com/cwp_inventory.cfm

How to get the data



ANR's Natural Resource Atlas – an online mapping program that includes many of the Agency's important resource layers
http://anrmaps.vermont.gov/websites/anra5/

ANR's BioFinder –a map and database identifying Vermont's lands and waters supporting high priority ecosystems, natural communities, habitats, and species.
http://biofinder.vermont.gov/

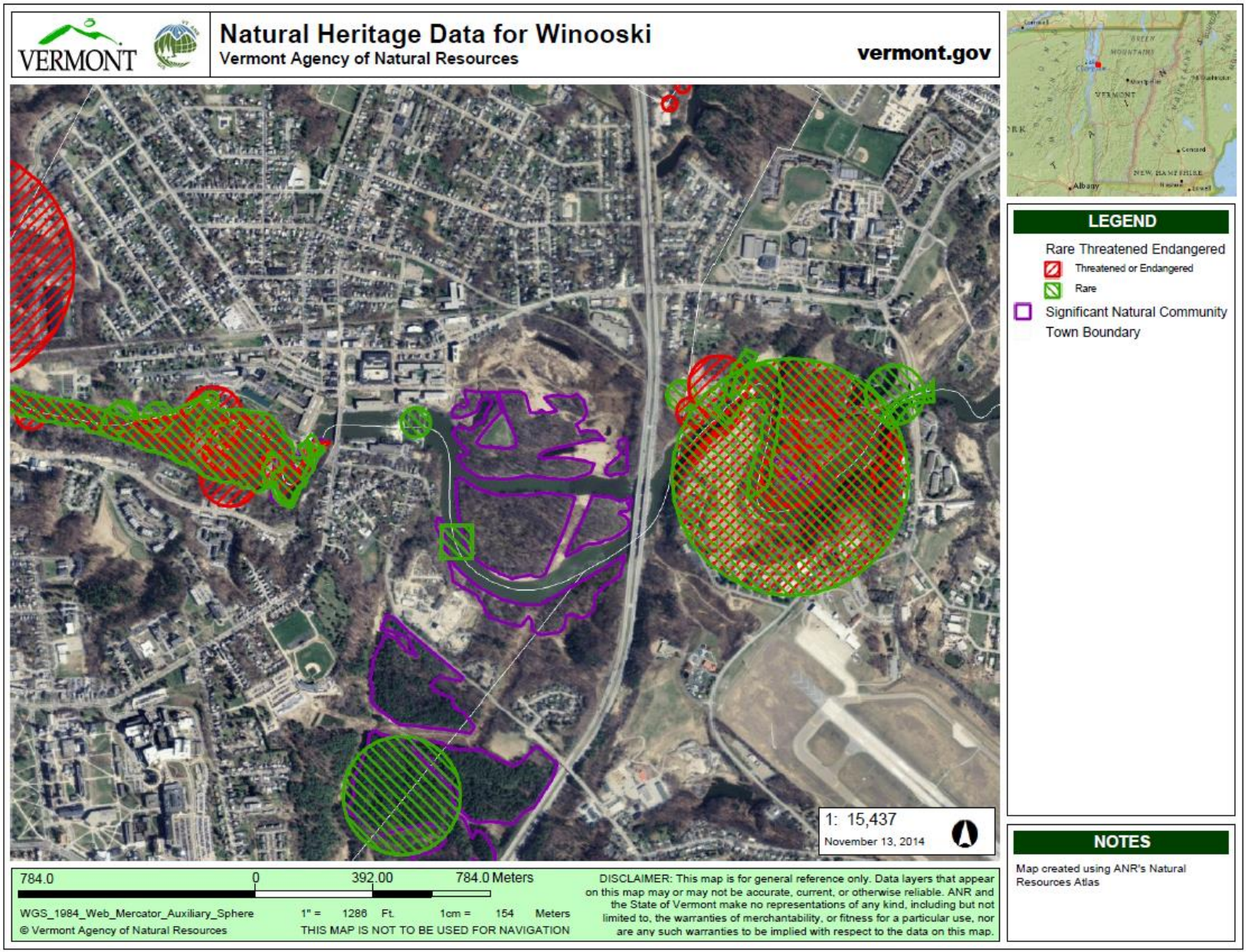
Vermont Center for Geographic Information

http://vcgi.vermont.gov/

Your local regional planning commission

Contact Everett Marshall with VFWD at 802-371-7333 for custom reports and data use agreements. everett.marshall@state.vt.us

Example of Natural Heritage Inventory data for Winooski



Practical considerations in conducting a town inventories

- **Grant sources**
  - **Municipal Planning Grants – Agency of Commerce and Community Development**
  - **Watershed Grants – VT DEC and VT FWD – water related projects, including inventory (http://dec.vermont.gov/watershed/cwi/grants/watershed-grants)**

- **Hire consultant with town inventory experience**

- **Typical (low) cost for town natural resources inventory: $15,000 to $20,000** – not including landowner contact

How to use forest block, wildlife corridor, natural community, and rare species data at the town level:

- Provides knowledge for landowners and community members
- Federal and state conservation programs, such as EQIP (Environmental Quality Incentives Program) provide assistance to landowners
- Conservation easements and grants
- Town Plan – defines the important features!
- Town conservation areas, such as town forests
- Subdivision regulations
- Zoning

Practical considerations in conducting a town inventories

- **Get residents and town committees involved!**
  - Send a postcard or letter to residents
  - Post on Front Porch Forum (http://frontporchforum.com/)
  - Hold workshops in town with the consultant

- **Landowner Contact**
  - Get landowner permission to visit their property!
  - Volunteers and town committees make contacts
  - send letter or card to landowners or call landowners
  - Landowner contact increases town involvement

Non-Regulatory Approaches

- Use Value Appraisal (Current Use)
- Conservation easements and land trusts (prioritize features)
- Site design around mapped natural resource features – biological inventories, management plans
- Compact, village-style development
- Town Forests

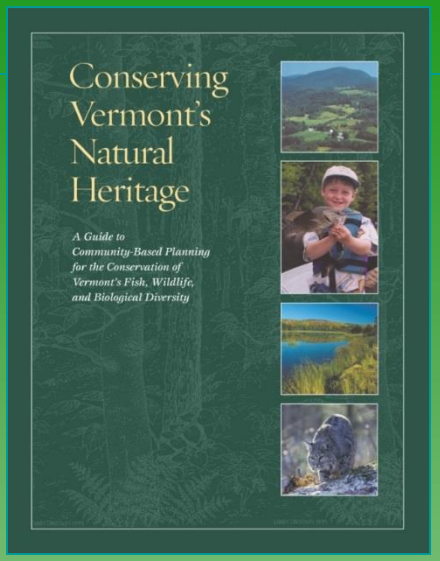
Regulatory Approaches

- Standards for development review must be clear and unambiguous! Define terms. (See VNRC's guidance)
- Conservation/forest zoning districts
- Overlay districts
- Subdivision regulations
- Planned Unit Developments
- Clustering and conservation subdivisions

Reviewing and Revising Town Documents

- Town Plans
- Zoning and Subdivision
- Regional Plans

These publications offer strategies for applying biodiversity information in town and regional plans



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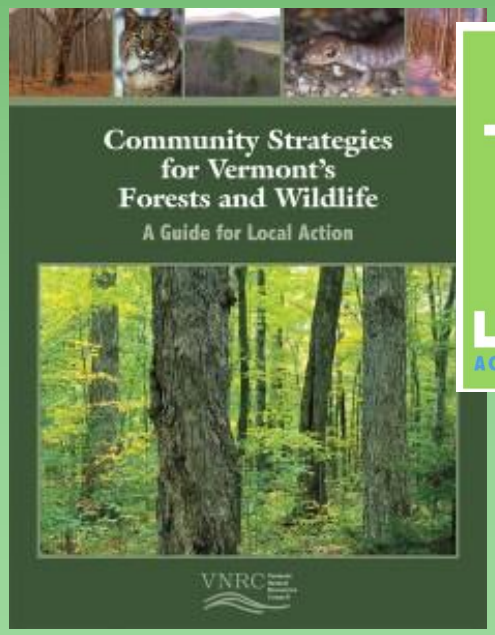
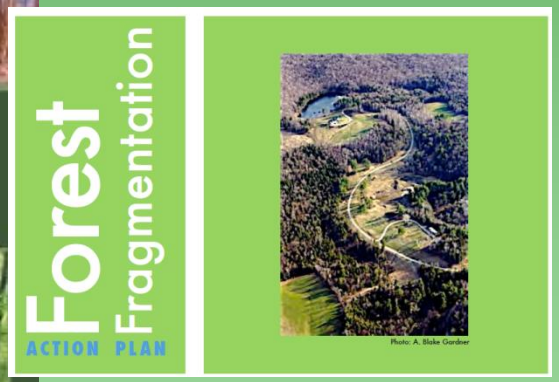
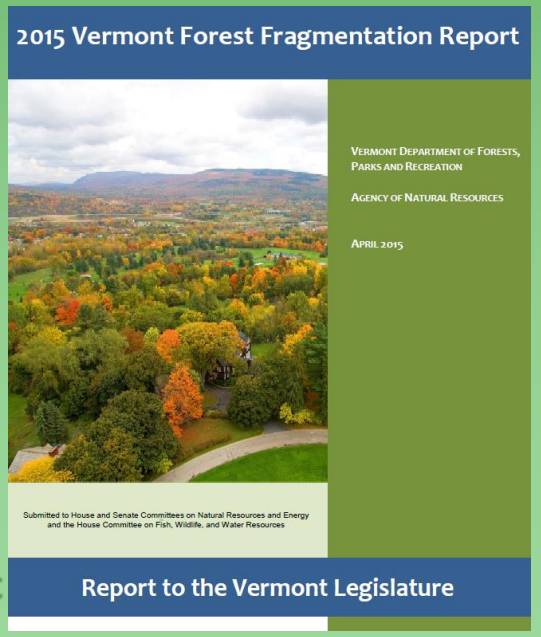




http://vnrc.org/



http://anr.vermont.gov/forests-parks-rec

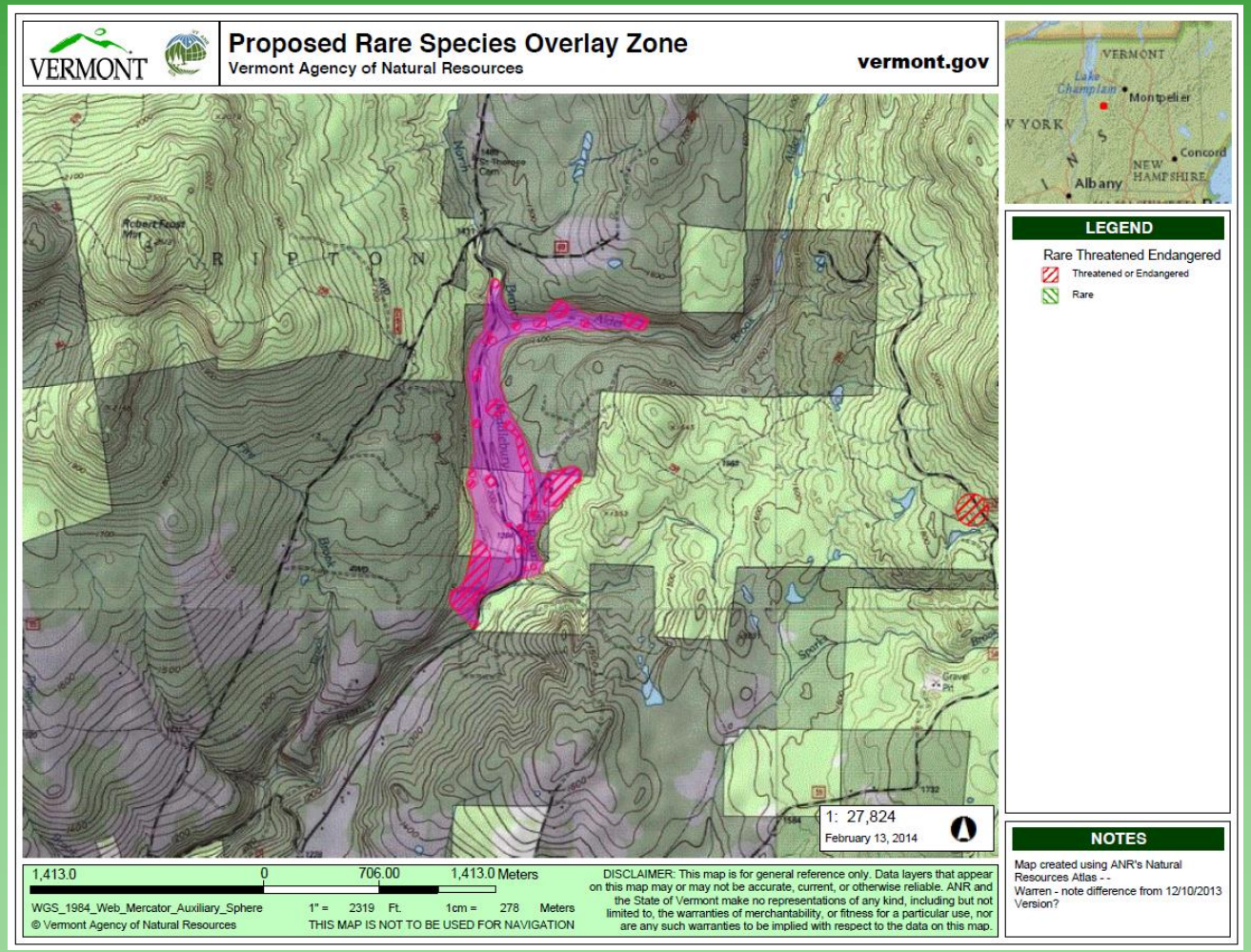
Town plan example

Goals

- Ensure adequate protection and preservation of rare, threatened, and endangered species (RTE) and significant natural communities.
- Protect important natural areas, critical wildlife habitat and overall biodiversity, with the help of landowners.
- Provide connectivity among natural areas and critical wildlife habitat.

Lincoln VT Example: Jacob's Ladder (S2, Threatened plant)

- Lincoln has developed draft language for rare species overlay zone
- requires a 50 foot buffer and review of development by ANR



Many Ways of Moving Forward

Range of options

Landowner

- Education
- Landowner Management decisions
- Incentive Programs
- Management Agreements
- Conservation Easements
- Land Acquisition

Municipal

- Education & Outreach
- Inventory
- Town Plan
- Conservation Plan
- Bylaws
- Zoning

No one tool is right for every landowner or town

Fish and Wildlife Department Contacts:

Jens Hilke – conservation planning – 879-5644

Dave Adams – habitat specialist – 879-2330

Everett Marshall – access to datasets – 371-7333

Eric Sorenson – natural communities – 476-0126

Bob Popp – rare plants – 476-0127

Mark Ferguson – rare animals – 279-3422

Or e-mail us: first.last@vermont.gov

Questions? Discussion …